ART 34 AMDT

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what is claimed is :

~~Claims~~

1. A method for manufacturing a waveguide in circuit structures manufactured with the multilayer ceramic technique, in which method the dimensions and structural directions of the circuit structures can be determined by means of x, y and z axes perpendicular to each other, and the circuit unit is assembled of separate ceramic layers (41, 61a, 61b), the permittivity ε_r of which is higher than the corresponding value of air, and in which layers cavities (22, 26, 32, 36, 42, 46, 52a, 52b, 52c, 56a, 56b, 56c) and holes (38, 39, 48, 49, 64a, 64b) of the desired shape are made and on the surface of which ceramic layer a conductive layer of material (24, 25, 34, 35, 44, 45, 54a, 54b, 54c, 55a, 55b, 55c, 62a, 62b, 65a, 65b) is silk screen printed on the desired location, and the circuit structure is completed by exposing the circuit structure to a high temperature, and in which method for creating a waveguide essentially in the direction of the z-axis

- at least two impedance discontinuities essentially parallel with the yz plane of the structure and of the length of the waveguide are formed in the circuit structure to limit the length a of the core part (23, 33, 43, 53a, 53b, 53c) of the waveguide in the direction of the x-axis,
- and in the xz plane the core part (23, 33, 43, 53a, 53b, 53c) of the waveguide is limited by essentially parallel first (24, 34, 44, 54a, 54b, 54c, 62a, 62b) and second (25, 35, 45, 55a, 55b, 55c, 65a, 65b) planes of conductive material, which are manufactured above and below the ceramic layers that form the core part of the waveguide in the direction of the y-axis, and which conductive first and second planes are used to limit the measure b of the core part (23, 33, 43, 53a, 53b, 53c) of the waveguide in the direction of the y-axis,

characterized in that

in the method for creating a waveguide essentially in the direction of the z-axis said two impedance discontinuities of the length of the waveguide essentially in the direction of the yz plane of the structure are accomplished by forming air-filled cavities (22, 26) essentially in the direction of the z-axis on both sides of the core part (23) of the waveguide in the structure

2. A waveguide manufacturing method according to Claim 1, **characterized** in that two impedance discontinuities of the length of the waveguide essentially in the direction of the yz plane of the structure are accomplished

- by forming air-filled cavities (32, 36) essentially in the direction of the z-axis on both sides of the core part (33) of the waveguide in the structure
- and by placing in the core part (33) of the waveguide close to both air-filled cavities (32, 36) at least one row of vias (38, 39) filled with conductive material and essentially in the direction of the y-axis, by which said first (34) and second (35) planes of conductive material are galvanically connected.

3. A waveguide integrated into circuit units manufactured with the multilayer ceramic technique, wherein the dimensions and structural directions of the circuit units can be determined by means of x, y and z axis perpendicular to each other, and the circuit unit has been assembled of separate ceramic layers (41, 61a, 61b), the permittivity ε_r of which is higher than the corresponding value of air, and in which layers cavities (22, 26, 32, 36, 42, 46, 52a, 52b, 52c, 56a, 56b, 56c) and holes (38, 39, 48, 49, 64a, 64b) of the desired shape have been made, and on the surface of which ceramic layers a layer of conductive material has been made on the desired location, which waveguide comprises:
- a core part of the waveguide (23, 33, 43, 53a, 53b, 53c) essentially in the direction of the z-axis of the structure of the circuit unit,
- at least two impedance discontinuities essentially in the direction of the yz plane, essentially parallel and of the length of the waveguide, which limit the dimension a of the core part (23, 33, 43, 53a, 53b, 53c) of the waveguide in the direction of the x-axis, and
- a first (24, 34, 44, 54a, 54b, 54c, 62a, 62b) layer of conductive material essentially in the direction of the xz plane and essentially of the length of the waveguide, and
- a second (25, 35, 45, 55a, 55b, 55c, 65a, 65b) layer of conductive material essentially in the direction of the xz plane and essentially of the length of the waveguide,

which first and second layers are essentially parallel and which limit the dimension b of the core part (23, 33, 43, 53a, 53b, 53c) of the waveguide in the direction of the y-axis,
characterized in that
said impedance discontinuities essentially in the direction of the yz plane have been formed by means of the air-filled cavities (22, 26) and the interface of the core part (23).

4. A waveguide according to Claim 3, **characterized** in that said impedance discontinuities essentially in the direction of the yz plane have been formed
- of air-filled cavities (32, 36) placed essentially in the direction of the z-axis on both sides of the core part of the waveguide, and
- of vias (38, 39) essentially in the direction of the y-axis, filled with conductive material and placed in at least one row in the core part (33) of the waveguide close to both air-filled cavities, by which vias said first and second layers have been connected.

5. A waveguide according to Claim 3, **characterized** in that a hole (58a) has been made in the first surface (54a) of the waveguide for exciting the electromagnetic field intended to propagate in the waveguide.

6. A waveguide according to Claim 4, **characterized** in that a hole (58b) has been made in the first surface (54b) of the waveguide, through which hole a probe (59b) has been led to the core part (53b) of the waveguide for exciting the electromagnetic field intended to propagate in the waveguide.

7. A waveguide according to Claim 3, **characterized** in that a hole (58c) has been made in the first surface (54c) of the waveguide, through which hole a coupling loop (59c) has been led to the core part (53c) of the waveguide for exciting the electromagnetic field intended to propagate in the waveguide.